UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN No. 576

Contribution from the Bureau of Animal Industry
A. D. MELVIN, Chief

Rev. ed. follows

Washington, D. C. ▼ September 27, 1917

THE MANUFACTURE OF COTTAGE CHEESE IN CREAMERIES AND MILK PLANTS.

By Arnold O. Dahlberg, *of the Dairy Division.*

CONTENTS.

	Page.
Good raw material essential	1
Pasteurization of skim milk important	1
Equipment required	2
Method of manufacture	4
Ripening the milk	4
Cutting and heating the curd	5
Draining the curd	7
Salting, etc.	8
Packing and marketing	8
Yield of cheese	10
Using buttermilk for cottage cheese	11
Variation in method when buttermilk is used	11
Making buttermilk cheese	12
Cost of manufacture	13
Markets and prices	14
Summary	16

Cottage cheese, properly made, offers a most palatable and nutritious article of food at a relatively low price compared with the cost and nutritive value of many other foods, and the demand for it is increasing with the greater knowledge of its true value as a food. This variety of cheese may be made from skim milk, or a mixture of skim milk and buttermilk. The simple method of manufacture recommends its adoption by creameries and milk plants having skim milk or buttermilk which it is desired to dispose of to good advantage. Very little additional equipment is required, and the cost of manufacture is low, which enables the creamery to pay the patrons a good price for the skim milk.

GOOD RAW MATERIAL ESSENTIAL.

As the quality of cottage cheese is entirely dependent upon flavor and texture, it is very important to have milk of a good, clean flavor, free from any foreign odors. The maker can control the texture of the cheese, but if the flavor is to be controlled, good raw material is necessary.

PASTEURIZATION OF SKIM MILK IMPORTANT.

It is advisable to pasteurize the fresh skim milk just as it comes from the separator, and to begin manufacturing as soon as possible, in order to control the fermentation or souring to the best advantage. No trouble need be experienced in making a high quality of cottage cheese, possessing both the characteristic flavor and body, from properly pasteurized skim milk of good quality. Pasteurizing the milk at a temperature of 145° F. for 30 minutes in no way affects the coagu-

lability of the milk or the handling of the curd in making cottage cheese. A higher temperature, however, should be avoided if the best results are to be obtained, because it gives a fine curd which is much harder to handle during the process of manufacture. Perhaps the greater portion of the cottage cheese used is made from raw skim milk, but the benefits to be derived from proper pasteurization are so great as to make it highly advisable to adopt that system of manufacture. Pasteurization adds but little to the cost of making and has the following important points in its favor:

1. It insures a sanitary, safe food product free from all danger of disease-producing bacteria.

2. It makes it possible to exercise a more perfect control of souring through the use of pure-culture starters, thus insuring the formation of an acid curd, giving the characteristic, mild, sour-milk flavor so much desired.

Pasteurization requires little additional work, provided suitable equipment is available. The use of a pasteurizing vat, so elevated as to allow the pasteurized milk to run into the "making vat" by gravity, gives most satisfactory results.

EQUIPMENT REQUIRED.

Any equipment needed for making cottage cheese, in addition to that already in the creamery or milk plant, depends upon the apparatus on hand and whether the skim milk is to be pasteurized. When a pasteurizer and a channel-bottomed vat are available, very little expense is necessary. Assuming that the skim milk is to be pasteurized, the following-named apparatus will be needed:

Pasteurizer.
Channel-bottomed cheese vat.
Drain rack.
Drain cloths.
Curd knives.
Curd pail.
Vat whey strainer.

PASTEURIZER.

The holding system of pasteurization is to be preferred. It requires a pasteurizing vat which may also be used for cooling the skim milk to the ripening temperature, after which the milk is run into the making vat. The skim milk for more than one batch of cheese may be handled in one pasteurizing vat, provided all of it does not have to be taken care of at once.

The flash method of pasteurization can be used with good results, but in order to prevent any possible effect upon the natural coagulation of the milk care must be taken to guard against the use of too high a temperature.

In case the cottage cheese is to be made from unpasteurized skim milk, the largest item of expense, which is the pasteurizer, will be eliminated.

CHEESE VAT.

The channel-bottomed cheese vat is of the ordinary type, with a steam connection for the purpose of heating the curdled skim milk.

DRAIN RACK.

The drain rack (fig. 1) should be made of either cypress or a good grade of white pine. A frame 3 feet 4 inches wide by 6 feet 4 inches long, outside dimensions, is made of surfaced 2 by 4 inch material, using mortised joints and allowing the ends of the longer pieces to project 3 inches. This frame is made by laying the pieces flat. On the inside edge of each side piece bore a $\frac{7}{8}$-inch hole, about 2 inches deep, 1 foot each way from the middle, and slip a half-inch galvanized pipe of the proper length into the hole when putting the frame together. The pipes support the wire screening and keep it from getting loose. Three galvanized swivel casters are fastened to each side on the bottom of the frame to allow the drain rack to be handled conveniently. Galvanized-wire screen of four meshes to the inch is nailed to the top of the frame with staples, taking care to draw it tight and let it extend a little over the middle of the frame all around. A wooden strip, wide enough to cover the edge of the galvanized screening, is nailed around the outside edge of the upper part of the frame, to hold the top part in proper position. The top part is made of $1\frac{1}{2}$ by 12 inch surfaced material with mortised and spiked corner joints, each end of the side pieces projecting 6 inches. These projections, trimmed down to the shape of a handle, make the rack more convenient.

Two drain racks of the dimensions given are large enough to hold the curd from 400 gallons of skim milk. The curd drains quickly in the drain racks, which permits them to be used repeatedly until all the cheese is made.

DRAIN CLOTHS.

The material used for the drain cloths must be easy to wash and so strong that it will not tear during the manipulation of the curd. The drain cloths made of cheesecloth of the kind ordinarily used are unsatisfactory because they lack strength, whereas those made from a grade of even-count, round-thread, unmercerized voile are very satisfactory and easy to keep clean. A drain cloth of the latter ma-

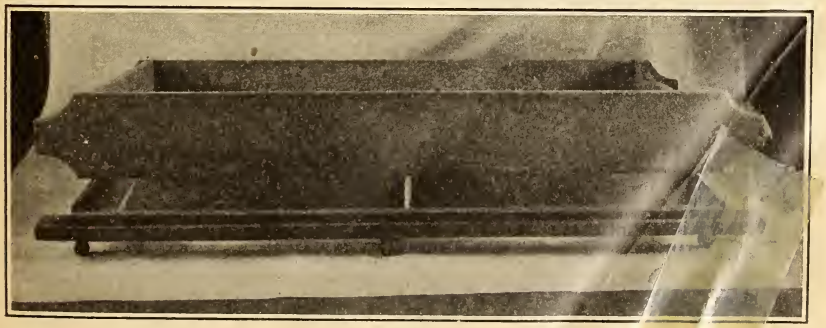

FIG. 1.—Drain rack.

terial will outlast several of those made from ordinary cheesecloth. To make a cloth of suitable size for a drain rack 3 feet wide, 6 feet long, and 12 inches deep, it is necessary to have two pieces of 36-inch material 3 yards long, which are sewed together at the middle with a treble flat seam and the edge hemmed to prevent raveling and unnecessary wear.

CURD KNIVES.

Two kinds of knives are used. One, which cuts the curd into horizontal layers about one-half inch thick, has metal strips or wires fastened horizontally to a frame. This knife is used by drawing it through the curd the long way of the vat. The second knife, which cuts the layers first into half-inch strips the length of the vat and then into cubes, has its strips or wires fastened vertically. The first cutting with it is done by cutting across the vat and then the long way of the vat.

CURD PAIL.

When the curd is to be dipped from the vat, a curd pail, whose side opposite the handle is flat, is more convenient than the ordinary round pail, because the curd at the bottom can be scooped up more easily.

VAT WHEY STRAINER.

The strainer commonly used is of metal, cylindrical in shape, about 5 inches in diameter, with a spout at the bottom which just fits the spigot opening. The strainer is placed in the vat with the spout in the spigot, which allows the whey to drain off, leaving the curd.

METHOD OF MANUFACTURE.

RIPENING THE MILK.

The object of ripening is to obtain the characteristic mild, sour-milk flavor and to develop the acidity necessary to coagulate the milk and bring about a separation of the whey from the curd when the coagulated milk (or coagulum) is heated. The temperature of ripening depends upon the time at which the cheese is to be made and the quantity of starter added.

Fresh milk should be set at a temperature which produces a firm, smooth, uniform curd at a time when it is desired to cut the curd. The ripening can be regulated by the temperature at which the milk is set and the quantity and kind of starter used. Experience soon will show the right combination of starter and temperature to be used for best results under existing conditions. A good, active, clean-flavored starter should be added at the rate of about 5 per cent of the skim milk and the milk allowed to set at a temperature of 60° or 70° F. This usually gives a smooth, uniform curd in from 6 to 12 hours. In case the milk is to be made into cheese the day it is received, a larger percentage of starter and a higher temperature for holding should be used to obtain the proper condition of curd.

Raw milk of good flavor, allowed to sour naturally, usually develops a well-flavored curd, but the probability of regularly obtaining a fine-flavored product is greatly increased by pasteurization and the use of a good starter. A starter of poor quality should never be used, because it does more harm than good by introducing undesirable fermentations; in fact, it would be better to depend upon the natural souring of the skim milk.

CUTTING AND HEATING THE CURD.

The best time to cut the curd is shortly after it shows a firm and uniform coagulation, with an acidity of from 0.65 to 0.80 per cent, for at that stage a mild-flavored cheese is obtained and at the same time sufficient acid is present to give a clear separation of the whey from the curd. The object of cutting and heating is to get rid of the desired quantity of whey and to remove much of the acidity, with the least possible loss of curd. The best method of cutting the curd is to use regular cheese-curd knives which cut the curd into fairly uniform cubes from which the whey can be expelled with but small loss of finely broken particles of curd passing through the drain cloth. To break the curd or coagulum with a mechanical stirrer produces too many fine particles of curd, which are easily lost in draining.

The heat is turned under the vat when the curd is cut, and the temperature raised gradually to the desired point, the curd being

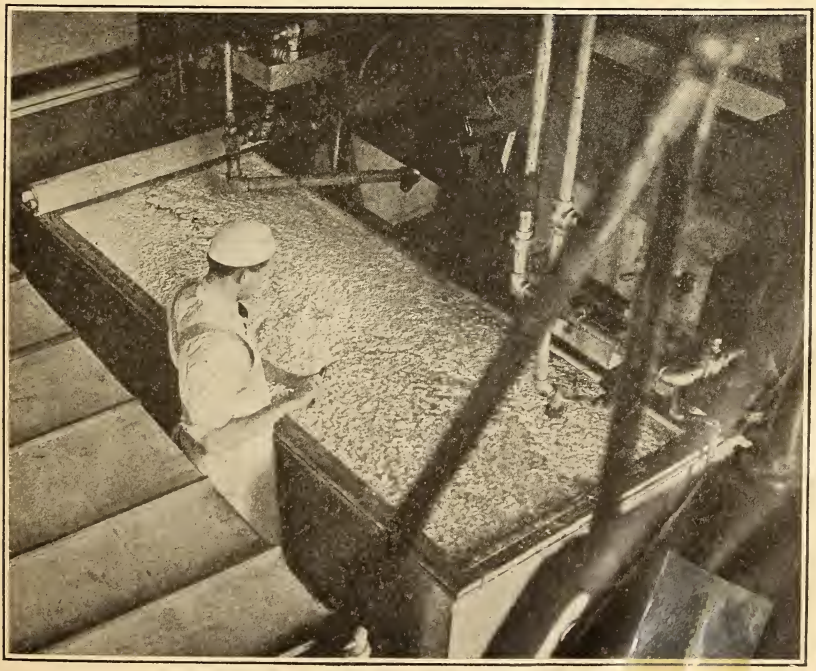

FIG. 2.—Stirring the curd during heating.

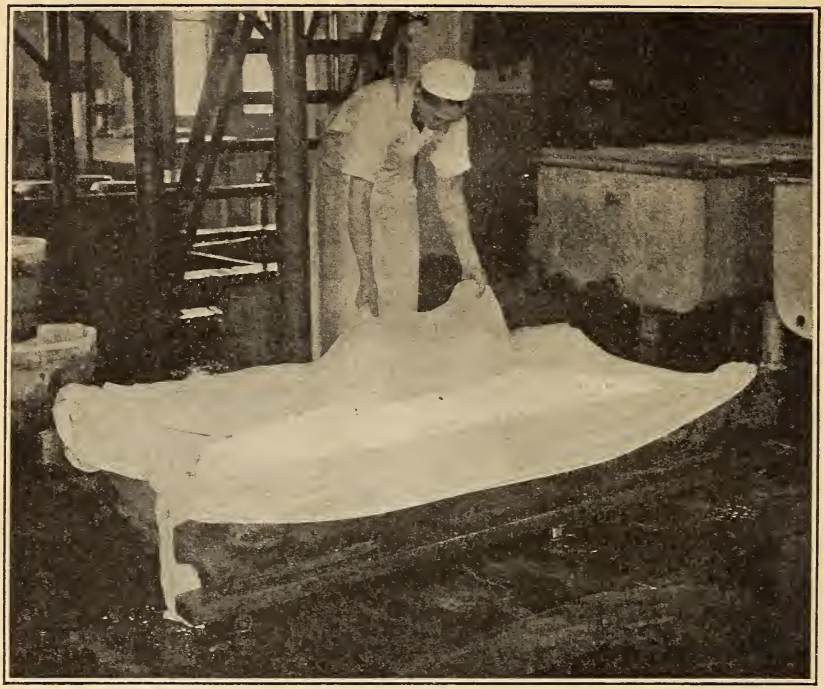

FIG. 3.—Raising and lowering the drain cloth to hasten draining.

stirred gently at frequent intervals to prevent its cooking on the sides and bottom of the vat. The texture of cottage cheese is controlled by the temperature at which the curd is heated, the length of time heated, and the extent of draining. Considerable variation is found necessary as to the temperature, time of heating, and draining, depending upon the condition of the curd. Temperatures between 90° and 105° F., depending upon the length of heating, give good results when a rather firm, smooth-textured cheese is desired. It is rarely necessary to exceed a temperature of 100° F. in making cottage cheese. To heat the curd to a higher temperature favors the more rapid expulsion of the whey and produces a dry, coarse-grained cheese. Similar results are obtained by holding the curd for a long period in the hot whey. The length of time that the curd should be held at the cooking temperature will vary from 15 to 30 minutes, depending upon the temperature used and the texture of the cheese desired. A high temperature or prolonged heating at a lower temperature produces a dry, coarse-grained cheese which is demanded by some markets. If a smooth, uniform-textured cheese is to be made, care must be taken not to heat the curd too long, especially when a high temperature is used. Experience will serve as a guide to determine the length of time and the temperature for heating. The smooth, even-textured cheese brings out the fine flavor to the best advantage, as it has none

of the harshness or grittiness found in the dry, coarse-grained product. It is well to remember that the lower the temperature used for separation the smoother is the texture of the cheese. The use of a higher temperature shortens the time required for making, but much greater attention must be given to the various steps in the process of manufacture.

DRAINING THE CURD.

When the heating has continued for the proper length of time the whey is drawn from the bottom of the vat into the cloth-lined drain rack. The greater portion of the whey passes through the drain cloth quickly, after which the remainder of the mixture of curd and whey is placed in the drain rack for the purpose of completing drainage. An occasional manipulation of the drain cloth, rolling the curd back and forth in the rack (as shown in fig. 3), hastens drainage, the extent of which depends upon the texture of the cheese desired, the temperature of heating, and the length of time the curd is heated. Except when a high temperature has been used the drainage can be controlled very easily and should continue until there is no accumulation of free whey in the finished cheese. A high temperature favors the accumulation of free whey in the finished product, unless the curd has been allowed to drain until the yield is materially reduced, and with the further probability of getting too dry a cheese. In case the draining is too rapid it can be checked by washing the curd with cold water, which hinders the expulsion of moisture. Free whey in the finished cheese gives rise to a very strong, sour flavor.

FIG. 4.—Salting the cheese.

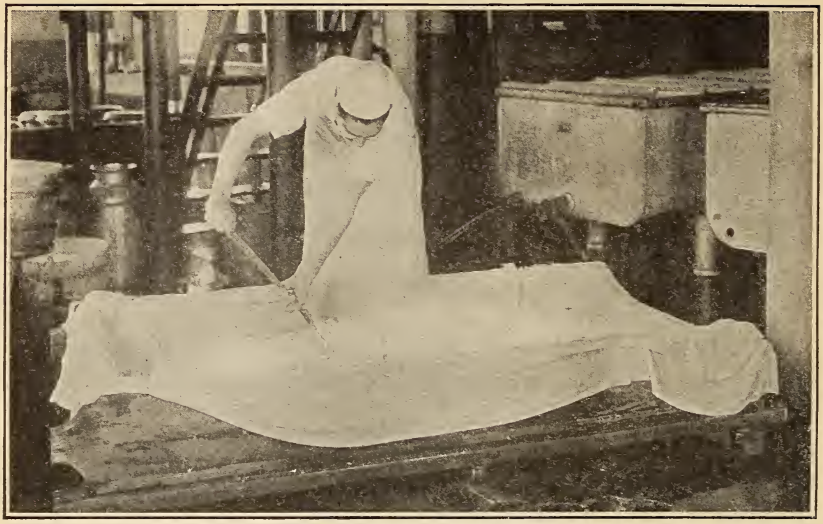

FIG. 5.—Working the salt in.

SALTING, ETC.

When the curd has drained sufficiently, salt is added and well worked into the cheese. The rate of salting is determined by the demand, some markets desiring a light-salted and others preferring a heavy-salted cheese. One and one-quarter pounds of salt to 100 pounds of cheese gives a medium-light salted cheese satisfactory to the ordinary taste. From 3 to 4 ounces of salt to 100 pounds of milk is about the right degree of salting and perhaps may be a better basis on which to begin the work. It usually is advisable to salt rather lightly, allowing the consumers greater opportunity to prepare the cheese to suit their individual tastes.

The addition of 1 pound of sweet cream to 10 pounds of cheese greatly increases palatability and is to be recommended, especially when it is desired to build up a trade appreciating high-quality products. The cream is worked into the cheese with the salt. The additional cost of cream is small when it is considered that each pound added makes an extra pound of cheese.

PACKING AND MARKETING.

The ideal method of marketing is to pack the cheese in the small, single-service, sanitary, paraffined paper containers, of which there are many kinds on the market (see fig. 6). The containers offer a convenient form for the dealer to handle, and are attractive to the buyer. While cartons add considerably to the cost of marketing, the extra price obtained for the product in that form usually compensates for the additional expense.

Cheese to be shipped in bulk may be packed in butter tubs (fig. 8) or in ordinary milk-shipping cans.

FIG. 6.—Cartons for marketing cottage cheese.

Cottage cheese always should be packed immediately after it is salted and should be marketed within a few days, as it is perishable and deteriorates very quickly at ordinary room temperatures. To insure marketing in best condition and to prevent unnecessary loss, it is important to have the cheese placed in the cooler or refrigerator immediately after it is made and to hold it at a low temperature until disposed of. Freshly made cheese should not be shipped until after it has been well cooled, because the warm curd is in a condition favoring fermentation and deterioration in quality.

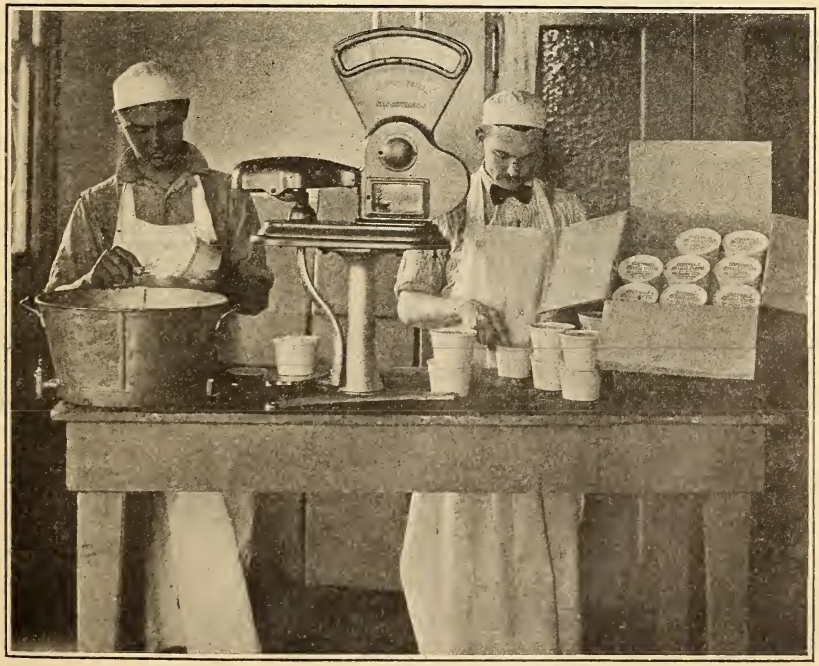

FIG. 7.—Packing the cheese in cartons.

FIG. 8.—Packing the cheese in tubs.

It is advisable, therefore, to hold the freshly made cheese in the refrigerator overnight before making shipment.

YIELD OF CHEESE.

The yield of cheese, which varies from 12 to 22 pounds for 100 pounds of milk, depends almost entirely upon the amount of moisture left in the curd, and is controlled by the method of manufacture. The factors that influence the percentage of moisture in the curd and determine the yield are—

1. Temperature of heating curdled milk (or coagulum).
2. Length of time curd is heated.
3. Extent of draining.
4. Physical condition of the skim milk after curdling.

As previously stated, a high temperature, together with prolonged heating of the coagulum, favors the rapid expulsion of moisture from the curd, which results in a low yield of dry, coarse-grained cheese. The percentage of moisture left in the curd can be controlled very well by the extent of drainage, provided too high a temperature has not been used in the process of manufacture and the curd has not been heated too long. The physical condition of the skim milk after curdling also often has a marked influence upon the resulting yield. A weak, unevenly coagulated curd, when cut, produces a large quantity of fine curd, much of which is generally lost during drainage.

The yield obtained is controlled by the method of handling, which in turn depends upon the demands of the market. The ideal cheese, which brings out the delicate, mild-acid flavor to the best advantage, is a rather firm, smooth-textured product, free from any harshness or coarseness. A yield of from 15 to 20 pounds of that kind of cheese can be obtained from 100 pounds of skim milk.

USING BUTTERMILK FOR COTTAGE CHEESE.

While skim milk, pasteurized and ripened with a commercial starter, produces a cottage cheese of excellent quality, a high quality of cheese which will pass the most critical inspection can be made with a mixture of skim milk and buttermilk, using as high as 50 per cent of the latter. The buttermilk must be of good quality, however, and not possess the old, metallic flavor so characteristic when it has been improperly cared for. Buttermilk of good quality can be used also to good advantage for ripening pasteurized skim milk. When so used, the buttermilk should be added to the skim milk as soon as possible after coming from the churn and before there is any development of the metallic flavor. The proportion of buttermilk which may be used advantageously without reducing the quality of the cheese depends upon its quality. An old, strong flavor develops much more readily in cottage cheese containing a high proportion of buttermilk, especially if the latter has been allowed to develop the metallic flavor.

Cheese made from buttermilk or from a mixture containing skim milk and buttermilk has a much smoother body than that made from all skim milk. The body of cheese made from a mixture of the two holds up better in storage, as it does not become so dry and coarse upon standing. The smoother-textured cheese obtained when buttermilk is used is better adapted to some of the uses to which cottage cheese is put than the skim-milk product.

VARIATION IN METHOD WHEN BUTTERMILK IS USED.

When buttermilk from cream that was pasteurized sweet and then ripened is used by mixing it with skim milk, the method as a whole is the same as for straight skim milk except for some variation in temperature and in the method of handling, and the directions which follow are based upon that kind of material. Buttermilk from pasteurized sour cream, however, is unsuitable for this method. The pasteurization of sour cream has an injurious effect upon the condition of the buttermilk curd, depending upon the degree of acidity, the temperature used, and the method of pasteurizing, and may make it impossible to obtain satisfactory results when using the methods outlined; and buttermilk from high-acid pasteurized cream can not be handled satisfactorily by the methods given.

The skim milk and buttermilk should be mixed and set to ripen as soon as possible after the buttermilk comes from the churn. If possible, definite proportions of skim milk and buttermilk should be used for each batch of cheese, so that certain rules, determined by experience, may be followed more closely in order to manufacture a uniform product from day to day. By using buttermilk from properly pasteurized cream in combination with pasteurized skim milk the danger from disease-producing bacteria may be guarded against.

It is difficult to give any definite directions as to the temperature to be used when a mixture of skim milk and buttermilk is handled, as it is impossible to tell with any degree of accuracy how the curd will act during the process of manufacture. Buttermilk from cream ripened to a high acidity works much differently from that of cream ripened to a low degree of acidity, and because of the direct influence of the condition of the buttermilk a variation in the range of temperature is necessary. A much higher temperature for heating the coagulum can be used with a mixture containing a good proportion of buttermilk with less danger of injury to the quality of the cheese. A temperature of 90° to 115° F. produces the desired results with a mixture containing as high as 50 per cent of buttermilk, although it rarely is necessary to exceed 105° F. Additional time is required for draining the curd from a mixture containing a large proportion of buttermilk.

In salting the curd from a mixture of buttermilk and skim milk care must be taken to prevent a mottled effect on the color of the finished cheese. The curd from the skim milk is perfectly white compared to a creamy color of that from the buttermilk, owing to the butter color added to the cream. The color of the buttermilk curd gives a richer looking product, provided it is well blended throughout the cheese to prevent an unevenness of color.

The yield of cheese from a mixture of skim milk and buttermilk in the proportions indicated compares favorably with that made from straight skim milk, and is likewise affected by the same influencing factors largely under control of the maker.

The advisability of using a mixture containing much more than 50 per cent of buttermilk is doubtful. Experience indicates that the use of about 50 per cent of skim milk is necessary in order to insure the highest quality of cheese. The use of more than 50 per cent of buttermilk lessens the quality of the product, which can not be sold as the best grade of cottage cheese.

MAKING BUTTERMILK CHEESE.

Creameries having only buttermilk of good quality can make it into a fair grade of buttermilk cheese by using the vat method or the ejector method of heating the soured buttermilk to precipitate the curd.

Because of the fineness of the curd in heating the buttermilk, extreme care must be taken to prevent breaking it up still finer. The amount of stirring required to bring the temperature of a vat full of buttermilk up to the proper point has a tendency to break up the curd so that a portion of it is liable to be lost during the process of draining. The method of running the soured buttermilk through the ejector heats the buttermilk to the required temperature with the least possible breaking up of the curd. With that method the curd

is separated clearly and quickly from the whey and invariably rises to the top, facilitating a quick removal of the larger portion of the whey and making it possible to obtain the finished cheese in a short time. By means of a valve in the pipe leading from the buttermilk tank to the ejector and one in the steam pipe next to the ejector, the temperature to which the buttermilk is heated can be controlled easily. The proper temperature necessary for separating the curd clearly and quickly can be obtained readily by using a glass tumbler to catch samples of the heated buttermilk as it comes from the ejector. At the proper temperature the curd quickly rises to the top, and the whey is clear. By varying the temperature the proper degree of heat required is determined.

COST OF MANUFACTURE.

Although the cost of manufacturing depends somewhat upon the cost of fuel and labor, it is influenced more largely by the volume of business. The table on page 14, obtained from cost-accounting records and showing averages for a three-months' period when the volume of business varied from 40,000 to 70,000 pounds of milk each month, gives a good idea of the approximate cost of manufacturing. The figures are based upon results obtained in the manufacture of cottage cheese in a commercial way at the creamery at Grove City, Pa., operated by the Dairy Division of the Bureau of Animal Industry, and, with the exception of the item of power, were obtained by making the proper tests to ascertain the expense of the different items. The labor represents the actual time of the men who did the work, figured at the rate which the average creamery would have to pay for the desired kind of help.

By making tests on the boiler to determine the number of pounds of water evaporated by 1 pound of coal, and by weighing the pounds of condensed steam required to pasteurize and later heat the milk to separate the curd, the cost of fuel was ascertained. The soft coal used cost $3.50 a ton, mine run. The cost of power is estimated at a figure considered sufficiently high to cover that item.

The quantity of water required to cool 1,000 pounds of milk was determined by measuring the actual water used to cool certain batches of pasteurized milk, and charging at the rate of 5 cents per 1,000 gallons.

Depreciation reserve was figured on the following basis:

Apparatus.	Value.	Probable life.	Annual depreciation.
Pasteurizing vat.....	$500	10 years...	$50
Making vat.....	100	4 years....	25
			75

Taking 300 as the probable number of days the vat would be used gives a daily depreciation of 25 cents. The number of days the vat was used each month and the quantity of milk handled during the same period afford a basis for determining the charge for depreciation per 1,000 pounds of milk.

The following figures were used in obtaining the charge for interest on investment:

Apparatus.	Value.
Pasteurizing vat	$500
Making vat	100
	600

The interest on $600 at 6 per cent amounts to $36 a year, or $3 a month. Twenty-six runs a month, handling two batches of 2,500 pounds each, gives 11.5 cents a day, or 2.3 cents as the interest charge for 1,000 pounds of milk.

Cost of manufacturing cottage cheese.

Item.	Cost per 1,000 pounds milk.
Labor	$0.790
Coal	.034
Power	.049
Cooling water	.020
Depreciation reserve	.084
Interest on investment	.023
Total	1.000

The cost is figured on the basis of 1,000 pounds of milk because of the greater variation which would be shown when figuring on the basis of pounds of cottage cheese, owing to the variation in yield. Figuring on the basis of a yield of 18 pounds per 100 pounds of milk the cost per pound of cheese would be $0.0055, or a trifle more than one-half cent a pound, with no allowance for cost of package. These figures may be lowered with an increased volume of business; a decreased volume would raise them. In fact, actual cost accounts maintained at Grove City during a month in which 145,000 pounds of skim milk and buttermilk were made into cheese show that the cost of making cheese per 1,000 pounds of milk was only 85 cents. When only a small quantity of cheese is made the regular creamery force may be able to do the work without any additional help, which would be an item of importance in determining the actual cost.

MARKETS AND PRICES.

In cities where large industrial concerns employ foreign labor there is already a good demand for cottage cheese, and a satisfactory market usually can be developed in other cities or localities. The market demands and prices fluctuate considerably with the condition

of the milk supply and the season of the year. An overabundance of milk makes more skim milk available for cottage cheese, thus tending to lower the price. As a whole the best market at the most favorable prices is afforded during the winter, with the Lenten season calling for the heaviest demands. A lighter market in the summer season may be attributed to a greater supply of available skim milk and to the fact that warm weather makes it more difficult for dealers to handle the cheese, and in some cases prohibits the trade. Dealers who make a specialty of handling cottage cheese assert that they are in position to buy and dispose of large quantities of the product throughout the year, the price to be governed by the quality of the cheese and the condition of the milk suppply.

The Grove City Creamery began the manufacture of cottage cheese for the purpose of utilizing skim milk and buttermilk to the best advantage and providing a market, at an attractive price, for the skim milk of the patrons who wished to leave it at the creamery. Skim milk and buttermilk were used in varying mixtures, and as high as 50 per cent of buttermilk was used, the proportion depending upon the quantity and quality of the buttermilk available. The business was begun in a small way, and because of other outlets through which the raw material could be disposed of to fairly good advantage no organized effort was made to develop a market that would take care of the increased receipts of skim milk and buttermilk. The demand for the product gradually increased, however, through unsolicited inquiries, until by the Lenten season of the second year the quantity of cheese which the creamery could sell was limited only by the capacity of the cottage-cheese equipment and the quantity of raw material available. Three business houses signified their willingness to handle all the cheese that could be made during the entire summer, provided it could be delivered in good condition, an item of great importance during the warm season. At Grove City the winter price received for the cheese without the addition of cream, packed in cans or tubs furnished by the buyer, varied from 4½ to 5½ cents a pound f. o. b. the point of manufacture. This price was for a medium, dry-grained cheese whose yield was from 14 to 16 pounds from a hundred pounds of milk. The wholesale price received for a smoother-grained cheese to which cream had been added at the rate of 1 pound to 10 of cheese and which yielded from 17 to 19 pounds per hundred pounds of milk, packed in the 12-ounce, single-service containers, was 7 cents a package net at the creamery, or at the rate of 9.3 cents a pound. The 12-ounce packages, including the shipping box, cost slightly less than 2 cents apiece and, filled with cheese of good quality, retail ordinarily for from 10 to 12 cents. The demand for cheese packed in the single-service containers is from the grocery stores and meat markets in the near-by towns and gives considerable promise.

It is very desirable that a uniform quality of cheese be made at all times in order that the trade that has been built up may be retained.

SUMMARY.

Cheese made from a good quality of skim milk or a mixture of skim milk and buttermilk is a most palatable and nutritious article of food.

Good raw material is essential in making a good product.

The pasteurization of skim milk insures a sanitary, safe food, free from all danger of disease-producing bacteria, and gives more favorable conditions for the manufacture of a uniform, high-quality cheese.

The main equipment necessary for making cottage cheese from pasteurized skim milk consists of (1) pasteurizing outfit, (2) channel-bottomed vat, and (3) draining racks, a portion or most of which already may be available at the creamery.

The skim milk is ripened to obtain the characteristic and desirable mild, sour-milk flavor, and this is best accomplished through pasteurization and the use of a commercial starter.

The method of manufacture is varied to produce cheese of the texture that the market demands.

The ideal cheese, bringing out the delicate, mild flavor to the best advantage, is a rather firm, smooth-textured cheese, with a yield of from 15 to 20 pounds of cheese to 100 pounds of skim milk.

A high-grade cheese can be made from a mixture of skim milk and good buttermilk, using some variation in the temperature and the method of handling.

The cost of manufacturing cottage cheese is low, depending upon the volume of business and the additional equipment necessary. Under ordinary conditions the cost of manufacture, not including packages, is approximately one-half cent a pound.

An excellent method of marketing the cheese is in the small, single-service, paraffined paper containers, which are most convenient for the dealer to handle and which keep the product in good condition.

A good market already exists in some cities and can be developed in any city or locality.

The normal demand and the price vary with the condition of the milk supply and the season of the year.

The creamery that makes a uniformly good quality of cheese will be affected least by changes in the market demand and will have the best outlet at the most favorable price throughout the year.

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1917